Active Tectonics of the Mt. Muşgüneyi: Implications for Western Part of the Turkish Iranian Plateau

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The Eastern Turkish High Plateau (ETHP) presents one of the most critical areas of Turkish-Iranian Plateau, where active slip rates and kinematics of the faults have been used in models that aim to describe the overall deformation characteristics (such as; the beginning of the collision and convergence velocity) of the Arabian-Eurasian collision. However, lack of the spatial distribution of horizontal slip and rock uplift rates of the Bitlis-Zağros Mountain Range (BZMR) prevent our understandings about active deformation of Turkish-Iranian Plateau. Mt. Muşgüneyi that constitute the NW part of BZMR and southern margin of the ETHP is critically important because conflicting viewpoints related to the active tectonics of both the ETHP, Turkish-Iranian Plateau and Arabian-Eurasian collision zone currently being adopted in research into it. In this study, I extracted spatial distribution of the fault geometry in the Mt. Muşgüneyi and river networks from DEM, satellite images and aerial photo in order to understand faulting mechanism and measure their cumulative offsets, respectively. Geomorphic indexes (mountain-front sinuosity, valley floor width to valley height ratio, transverse topographic symmetry factor, asymmetry factor, hypsometric curve and integral) and drainage pattern analysis (channel concavity, integral analyses and knick point analyses) have been used to isolate the tectonic activity of the region. The results of this study reveal that although dozens of dextral faults accommodate the strain in the region, the 260 km length dextral Kavakbaşı Fault is the most important structure in the NW part of BZMR and it takes 60% of overall deformation. Previous studies suggest that 3–4.5 Ma is needed to account for the measured 9 km cumulative offset in this region, however, I measured c.a. 24 km cumulative horizontal offset on Kavakbaşı Fault that indicates c.a. 12 Ma needed to account for the offset. Morphometric studies point out sustaining significant uplift within the Mt. Muşgüneyi and signify the uplift rate is larger than horizontal slip rate moreover my results contradict the idea that change in the nature of the collision zone 5 ± 2 Ma ago. Furthermore, I propose that NW part of BZMR is extremely important to understand when the modern configuration of the boundary faults of the Anatolian Scholle did form? Considering similarities between the Kavakbaşı and the Nazimiye fault, which located at c.a. 70 km south of the North Anatolian Fault Zone in the Anatolian Scholle, in terms of their ages, orientations, slip senses and cumulative offset, I suggest that they belonged to the earlier dextral deformation zone along the southern margin of the collision that sinistrally offset by the East Anatolian Fault Zone (EAFZ) about 33±3 km. This offset estimate dived by calculated long-term slip rate of the EAFZ and Na-alkali basaltic activity in the Plio-Pleistocene that emplaced at the eastern part of the Anatolian Scholle yields that age of the EAFZ is 6 Ma. This study supported by TÜBİTAK Project No:115Y684.